

BMP #134 - Straw Bales/Biofilter Bags

DESCRIPTION

Temporary sediment barriers, consisting of a row of entrenched or anchored straw bales and/or biofilter bags, reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing runoff velocities. The barriers can be placed in various combinations to construct the required structure, as shown on the attached figures. They may also be used as a barrier to divert or direct small amounts of runoff around active work areas or to a slope drain, sediment trap or other filtration/sedimentation BMP. Both biofilter bags (plastic mesh bags filled with wood chips) and straw bales are temporary measures. They have a limited life span and must be regularly inspected and replaced when damaged.

APPLICATIONS

The barriers are effective at storm drain inlets, across minor swales and ditches, as diversion dikes and berms, along property lines, and for other applications where the need for a barrier is temporary and structural strength is not required. For instance:

- At the toe of embankment slopes
- At the outlet of slope drains
- As filter cores for log check dams
- In front of silt fences
- To protect inlets along paved streets

LIMITATIONS

These types of barriers are only suitable where flow rates are low (475 gal/min (30 liters per second) or less). They require regular inspections and repair, and periodic replacement (about 3 months maximum usefulness).

Do not use straw bale barriers for drainage areas greater than 1 acre (0.5 hectare). Straw bale barriers often prove ineffective at erosion control if poorly installed and maintained. Even when properly installed, temporary barriers are not usually as effective as silt fences (see BMP #135) or gravel berms (see BMP# 142). Straw bales used in conjunction with either of these controls may improve effectiveness and durability. Certified weed-free straw bales must be used instead of hay bales.

Targeted Pollutants

- ☒ Sediment
- ☐ Phosphorus
- ☐ Trace metals
- ☐ Bacteria
- ☐ Petroleum hydrocarbons

Physical Limits

Drainage area 1 ac/400ft
bales

Max slope 2% for bales;
10% for biobags

Min bedrock depth 2 ft

Min water table 2 ft

SCS soil type ABCD

Freeze/Thaw fair

Drainage/Flood control no

DESIGN PARAMETERS

Constructed Slope	Percent Slope	Slope Length Feet
2:1	50	25
2.5:1	40	50
3:1	33	75
3.5:1	30	100
4:1	25	125

Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single-family lot if the slope is less than 15 percent. The contributing drainage area in this instance shall be less than one acre and the length of slope above the dike shall be less than 200 feet.

Concentrated flows: No greater than 475 gal/min (30 liters) per second.

Useful life: 3 months maximum, depending on site conditions.

Buffer zone: An undisturbed buffer zone of 3 to 6.5 ft (1-2 meters) is necessary between the barriers and surface waters to allow safe removal of the barrier and of accumulated sediments.

Embedding: The barrier must be embedded to a minimum depth of 6 in (150 mm) and backfilled for the entire length of the barrier. Each bale or bag should be securely anchored with two stakes 2 in X 2 in X 3 ft (50 mm x 50 mm x 1 meter) or steel drift pins driven at least 20 in (500 mm) into the ground.

CONSTRUCTION GUIDELINES

Barriers used for sediment control at the toe of slopes must be in place prior to disturbing the slope. Install the bales a short distance away from the toe of the slope to increase the effective area but outside of any ditch channel.

Place the barriers in a single row lengthwise on the contour for sheet flow applications, or perpendicular to the contour in concentrated flow applications. When flows are expected to be high enough to surpass the infiltration capacity of the devices, the center (low point) bales shall be wrapped in filter fabric with a 3 ft (1 meter) tail stapled securely and extending from the down gradient side of the barrier to prevent scouring. The ends of the adjacent barriers must tightly abut one another.

Any gaps between barriers should be filled with tightly wedged straw. For concentrated flow applications, extend the end of the barrier so that the bottoms of the end units are at a higher elevation than the top of the lowest middle unit to

assure that sediment laden water flows through or over the barrier instead of around the ends.

MAINTENANCE

Perform one inspection during the first runoff producing event after the installation of the barriers to assure proper functioning. No more than one foot depth of sediment should be allowed to accumulate behind either bales or biofilter bags. Damaged barriers, undercutting, or end runs must be repaired immediately. Bales should be replaced as needed due to disintegration or rotting.

If approved, straw bales or biofilter bags may be used after project completion as mulch. Temporary sediment barriers should be removed within 30 days of final stabilization of the site. If rebar is used it must be removed.

Straw Bale Dike

Biobag placement for overland flow (Portland and USA, 1994)

Biobag placement for ditches and swales (Portland and USA, 1994)